

Replacing the Wide-Ultra SCSI Hard Drive in a Compaq Professional Workstation 5100 with an Ultra ATA Hard Drive

Introduction

The Compaq® Professional Workstation 5100 is a full-featured PC with support for Dual Pentium-II processors, integrated Wide-Ultra SCSI controller, integrated IDE interface, integrated 10/100BaseT networking, ECC memory, 2 ISA and 4 PCI slots,¹ and a host of other features.

This Assembly Guide discusses how to upgrade the 5100 from the standard 2.1GB Wide-Ultra SCSI drive to an Ultra ATA or similarly fast drive. You may want to do such an upgrade for hard drive speed or capacity reasons at a low price.

Note When finished, the on-board SCSI controller will be disabled. *The SCSI and Ultra ATA controllers apparently cannot coexist on this machine as bootable devices.*²

Required Equipment

You will need an Ultra ATA drive (e.g. Western Digital® WD200BBRTL 20 GB, 7200rpm), an Ultra ATA PnP PCI controller card (e.g. Promise® Ultra66) and cables, disk partitioning and copying software (e.g. PowerQuest® DriveImage 4.0), a Windows® 95B/98 boot floppy and three blank 1.44MB floppy diskettes.

Note You can obtain the *Compaq Professional Workstation 5100 Reference Guide* directly from Compaq's website at <http://www.compaq.com>, document 299348-003.pdf.

Subtleties

Compaq's approach to issues like system BIOS are substantially different from what is commonly encountered in PC "clones." On the 5100, a special, hidden disk partition at the beginning of the first drive contains Diagnostic and Setup programs. The Setup program also looks nothing like an Award® BIOS setup, for example.

The 5100 is commonly configured with Microsoft® Windows NT® or Windows 2000 Professional.

Note Each time the 5100 (re-)boots, it can take upwards of several minutes for the boot process to complete. This is especially true if any hardware changes have been made. Also, each time the system detects a hardware change and you accept it via the *F1 Save Changes* key, it will reboot.

The Basic Problem

It appears to be impossible to have the 5100's on-board SCSI controller coexist with an Ultra ATA controller when bootable drives are connected to the latter. This is probably due some inflexibility in the 5100's boot order. Therefore a relatively complex procedure must be followed to migrate from the SCSI drive to an Ultra ATA drive.

Note The 5100 does have an on-board IDE controller, which is commonly used for CD-ROM drives. It also supports hard drives, but is not bootable. Therefore the Compaq Diagnostic and Setup programs on diskette are required at certain times in the procedure outlined below.

The Setup Program

You will not be able to proceed without a working Setup program. If the 5100 is still in an as-delivered or updated configuration, the Diagnostic and Setup programs should be in place on the Wide-Ultra SCSI hard disk. They can be invoked at power-up by pressing the F10 key when a white rectangle appears in the upper right-hand corner of the video screen, just prior to booting the OS. Start the Diagnostic program and use the "Create Diagnostic Diskettes" option to create a set of one Diagnostic and two Setup diskettes (3 total).

If the *F10 Diagnostic and Setups for Compaq Workstations* are no longer on the drive, you will need to download the ones for the 5100 from Compaq's web site <http://www.compaq.com/support/>. Run the Setup program, which will create the three diskettes.

Note A hidden file, `registry.cpq`, located on *Setup diskette 1 of 2*, is required to run the Setup program. If the Setup diskette 1 of 2 created by the 5100's built-in Diagnostic and Setup program is missing this file, you will need to obtain it via the *F10 Diagnostic and Setups for Compaq Workstations* installer.

At this point, you need to become comfortable with running the Setup program from the diskettes. Do this by booting the computer with Setup diskette 1 of 2. Do not do this by booting with the Diagnostic diskette, and then selecting the Setup option. Verify that you can see the various peripheral IRQ settings, etc. Proceed only after you can successfully run the Setup program.

Outline of Procedure

The replacement procedure has these main steps:

- Install the Ultra66 PCI controller
- Use Compaq Setup program to configure the Ultra66 controller for use (the 5100 will detect a change to the PnP PCI status when the Ultra66 controller is installed)
- Connect the Ultra ATA drive to the on-board standard IDE controller
- Install the Compaq Diagnostics and Setup program onto the Ultra ATA drive
- Copy the contents of the Wide-Ultra SCSI drive to the Ultra ATA drive using disk copying software
- Disable the on-board SCSI controller
- Connect the Ultra ATA drive to the Ultra66 controller
- Enable Ultra ATA speeds on the Ultra ATA drive

Procedure in Detail

1. Obtain the latest BIOS for the 5100 from Compaq's web site. Follow their instructions and upgrade the BIOS. Power down.

Open the 5100's top cover. Install the Ultra66 controller. By installing it into the lowest of the set of three PCI slots (i.e. Slot 3), it can be assigned its own, unique IRQ.³ Do not connect the Ultra

ATA drive at this time. From the hard disk, run *Compaq Setup for Workstations*, select **Integrated and Add-in Peripherals, PCI boards**, then choose the Ultra66 controller and change its IRQ to a free one (IRQ 9 or 10). If you wish, you can also change one other system resource (e.g. the video card) to any remaining free/unused/available IRQs. Save your changes and reboot. Install the Ultra66 drivers for your operating system now.

Note At this point you should have a working system booting and running from the Wide-Ultra SCSI drive, with the Ultra66 controller installed but without any drives attached to it.⁴

Shut down.

2. Temporarily connect the Ultra ATA drive to the end of the IDE cable that is commonly also connected to a CD-ROM drive. Set the drive to *Master*, and the CD-ROM drive to *Slave*. Connect a power cable to the drive. Power up.

3. After a while the system BIOS will report that a new drive has been detected. It may also report a *1780 – Disk 0* error. Choose *F1 Save Changes*, remove any floppy diskettes from the floppy drive, and let the 5100 reboot.

4. If special software for handling drives greater than 8GB is supplied with your new Ultra ATA drive, install it now. Power down.

Note For some software, e.g. Western Digital's EZ-BIOS, you will have to pay close attention when the 5100 reboots and the Ultra ATA drive is attached – you must boot without a floppy in the drive, wait for the EZ-BIOS message to appear on the video screen, and only then boot from the floppy.

Note From this point forward, you can disregard any 1780 or 1790 errors reported by the BIOS during power up.

5. Disconnect the Wide-Ultra SCSI drive. Power up the 5100, and boot from a Windows 95/98 diskette. Use *fdisk* to remove all existing partitions from the Ultra ATA drive. Also do *fdisk /mbr* to clear the drive's Master Boot Record.

6. Reboot, this time with the Compaq Diagnostics diskette in place. Select **Manage Diagnostic Partition**, then **Create Diagnostic Partition**. After the process of installing the diagnostic partition to

the Ultra ATA drive is complete, remove the floppy diskette and reboot.

7. Now you should see a white block character in the upper right-hand corner of the screen just before the 5100 searches for an OS to load from the floppy or drive. In the future, you can press F10 at this time (about 2 seconds) and enter the Diagnostic and Setup program that is now on the Ultra ATA drive. Power down.

8. Reconnect the Wide-Ultra SCSI drive and Power Up. Boot from DriveImage diskette 1 of 2 and run DriveImage to copy the partition on the Wide-Ultra SCSI drive to the Ultra ATA drive. When you are done, each drive should have a small, hidden FAT16 primary partition and a larger, active NTFS primary partition following it. Power down.

9. Disconnect the Wide-Ultra SCSI drive's SCSI and power cables. Also, disconnect the SCSI cable from the motherboard and store it in a safe location, e.g. in the empty bay beneath the CD-ROM drive.⁵ Power Up the 5100, booting from the Compaq Setup diskette 1 of 2. Run *Compaq Setup for Workstations*, and disable the on-board Wide-Ultra SCSI controller by selecting Integrated and Add-in Peripherals, PCI boards, SCSI controller, View or Edit, Change, Resource Disabled, OK, OK, OK, Close, File > Save Changes and Exit, and reboot. Power down during the subsequent memory test.

10. Disconnect the Ultra ATA drive from the on-board IDE controller and connect it to the Ultra66 controller instead, using an 80-conductor cable (blue connector on controller end). Restore the CD-ROM drive's setting to *Cable Select*. Restart. This should result in a successful boot into Windows, using the Ultra ATA drive. If necessary, enable Ultra ATA speeds on the drive.

Congratulations! You should now have a working system.

Addendum – Adding Another PCI Card

Immediately after installing another PCI card (a FireWire / IEEE 1394 controller) into the 5100's Slot 5, the system would no longer boot – it would continually restart after the memory test and immediately before booting to the OS. Neither would it boot from a floppy.⁶ Below is the procedure used to complete a successful installation.

1. Disconnect the Ultra ATA drive, and reconnect the Wide-Ultra SCSI drive.⁷ Let the system boot, and enter the Setup program⁸ via

F10 when the white rectangle is in the upper right-hand corner of the screen.

Note The astute reader may wonder how the system is able to boot to the Wide-Ultra SCSI drive, given that the on-board SCSI controller was previously disabled. The answer is not known, though it may be the default behavior of the 5100 to re-enable disabled PCI peripherals whenever a PnP PCI change is detected.

2. In the *Integrated and Add-In Peripherals, PCI boards* section, make the following IRQ assignments:

SCSI controller	IRQ11	disabled
FireWire controller	IRQ10	enabled
Mass storage controller	IRQ9	enabled

Leave the rest (USB, Network and VGA compatible controllers) alone – they should all be enabled, and will probably all be on IRQ11. Power down.

3. Disconnect the Wide-Ultra SCSI drive, and reconnect the Ultra ATA drive to the Ultra66 controller. Power up. Windows 2000 immediately recognizes the FireWire controller.

¹ Slot 3 (PCI) shares space with Slot 4 (ISA).

² There is a "Boot Order" option in the Setup program. However, its usage is not clear.

³ According to the 5100's Setup program, Slot 1 (PCI) shares resources (e.g. IRQs) with the on-board USB controller, Slot 2 (PCI) with the on-board Network controller, and Slot 5 (PCI) with the on-board SCSI controller. Slot 3 (PCI) doesn't appear to share resources with anything.

⁴ By not having any drives attached to the Ultra66, you avoid a BIOS conflict between the Ultra66 and the on-board SCSI controller. This can only be resolved by disabling the SCSI controller when (bootable) drives are attached to the Ultra66.

⁵ It's wise to keep the Wide-Ultra SCSI drive and its cable inside the 5100 in case you need it later for an emergency, etc. See Addendum.

⁶ This inability to boot is symptomatic of a clash between the bootable on-board Wide-Ultra SCSI controller and the bootable add-on Ultra66 controller.

⁷ You did keep it and its cables, didn't you?

⁸ The Setup program can also be run from diskettes. However, it's faster to run it from the hard drive.